

BASIC MICROBIOLOGY SERIES

Introduction to Modern Virology

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Amersham, Buckinghamshire*

FOURTH EDITION

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Blackwell
Science

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Kurfürstendamm 57
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First published 1974
Reprinted 1978
Second edition 1980
Third edition 1987
Fourth edition 1994

Set by Setrite Typesetters, Hong Kong
Printed and bound in Great Britain
at the University Press, Cambridge

DISTRIBUTORS

Marston Book Services Ltd
PO Box 67
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54 University Street
Carlton, Victoria 3053
(Orders: Tel: 03 347-5552)

A catalogue record for this title
is available from the British Library
ISBN 0-632-03403-3

Library of Congress
Cataloging-in-Publication Data

Dimmock, N. J.
Introduction to modern virology/
N. J. Dimmock, S. B. Primrose. —4th ed.
p. cm.

Includes bibliographical references
and index.

ISBN 0-632-03403-3

1. Virology. I. Primrose, S. B.

II. Title. III. Series.

[DNLM: 1. Virus Diseases.

2. Viruses. QW 160 D562i 1994]

QR360.D56 1994

616'.0194—dc20

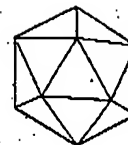
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Family: Reoviridae (class III)

10–12 segments of double-stranded RNA of total M_r $12-20 \times 10^6$. Particle is a 60–80 nm icosahedron. Has an isometric nucleocapsid with transcriptase activity. Cytoplasmic multiplication.

Genera: Reovirus – of vertebrates
 Orbivirus – of vertebrates, but also multiply in insects
 Rotavirus – of vertebrates
 Cytoplasmic polyhedrosis viruses – of insects
 Phytoreovirus – clover wound-tumour virus
 Fijivirus – Fiji disease of plants



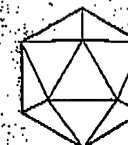
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 Roy, P. & Gorman, B. M. (1990) Bluetongue viruses. *Current Topics in Microbiology and Immunology*, 162, 1–200.

Family: Birnaviridae (class III)

Two segments of double-stranded RNA of M_r 2.5×10^6 and 2.3×10^6 in one 60 nm particle. Icosahedral with 45 nm core. RNA transcriptase present. Cytoplasmic.

Genus: Birnavirus (pancreatic necrosis virus of fish; infectious bursal disease of chickens; *Drosophila* X virus)

See: Becht, H. (1980) Infectious bursal disease virus. *Current Topics in Microbiology and Immunology*, 90, 107–121.



Family: Picornaviridae (class IV)

Single-stranded RNA of M_r 2.5×10^6 . Icosahedral particles of 30 nm. Multiplication is cytoplasmic.

Genera: Enterovirus (acid-resistant, primarily viruses of gastrointestinal tract)
 Rhinovirus (acid-labile, mainly viruses of upper respiratory tract)
 Aphthovirus (foot-and-mouth disease virus)
 Cardiovirus (encephalomyocarditis [EMC] virus of mice)
 Hepatitis A virus (of humans)
 Also various viruses of insects



See: Macnaughton, M. R. (1982) The structure and replication of rhinoviruses. *Current Topics in Microbiology and Immunology*, 97, 1–26.

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The classification and nomenclature of viruses 345

Subfamily: *Betaherpesvirinae*

Human cytomegalovirus

Mouse cytomegalovirus

Subfamily: *Gammapherpesvirinae* (lymphoproliferative viruses)

Epstein-Barr virus

Herpesvirus saimiri

Unclassified: Marek's disease virus

See: Davison, A. J. (1991) Varicella-zoster virus. *Journal of General Virology*, 72, 475-486.

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Rouse, B. T. (1992) Herpes simplex virus: pathogenesis, immunobiology and control. *Current Topics in Microbiology and Immunology*, 179, 1-179.

Stevens, J. G. (1989) Human herpesviruses: a consideration of the latent state. *Microbiological Reviews*, 53, 318-332.

Family: *Adenoviridae* (class I)

Double-stranded DNA of M_r 20-30 $\times 10^6$. Particle is a 70-90 nm icosahedron which replicates and is assembled in the nucleus.

Genera: *Mastadenovirus* (adenoviruses of mammals)

Aviadenovirus (adenoviruses of birds)

See: Doefler, W. (ed.) (1983/1984) The molecular biology of adenoviruses. *Current Topics in Microbiology and Immunology*, 109 (1983), 110, 111 (1984).

Ginsberg, H. S. (ed.) (1984) *The adenoviruses*. New York: Plenum Press.

Horwitz, M. S. (1990) Adenoviridae and their replication. In: *Virology* (2nd edn), Vol. 2, pp. 1679-1722. Fields, B. N. & Knipe, D. M. (eds.). New York: Raven Press.

Family: *Papovaviridae* (class I)

Double-stranded circular DNA. Particles have 72 capsomers in a skew arrangement and are assembled in the nucleus. Haemagglutinate. Oncogenic.

Genera: *Papillomavirus* (producing papillomas in several mammalian species including man) 50-55 nm particle, DNA 5×10^6 M_r . *Polyomavirus* (found in rodents, humans and other primates) 40-45 nm particle, DNA 3×10^6 M_r . Includes simian virus type 40 (SV40) and polyomavirus itself

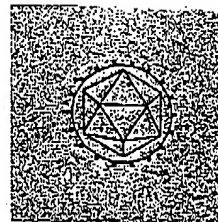
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- See: Lambert, P. F. (1991) Papillomavirus DNA replication. *Journal of Virology*, 65, 3417-3420.
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Family: Hepadnaviridae (class I)

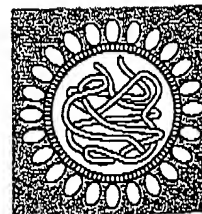
One complete DNA minus strand of M_r 1×10^6 with a 5' terminal protein. DNA is circularized by an incomplete plus strand of variable length (50-100%) which overlaps the 3' and 5' termini of DNA minus. There is a 42 nm enveloped particle containing a core with DNA polymerase and protein kinase activities. Includes hepatitis B (HBV) of humans, Pekin duck hepatitis, beechy ground squirrel hepatitis and woodchuck hepatitis viruses. HBV is strongly associated with liver cancer.



- See: Ganem, D. & Varmus, H. E. (1987) The molecular biology of the hepatitis B viruses. *Annual Review of Biochemistry*, 56, 651-693.
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- Tiollais, P., Pourcel, C. & Dejean, A. (1985) The hepatitis B virus. *Nature (London)*, 317, 489-495.

Family: Coronaviridae (class IV)

Single-stranded RNA of M_r $2-11 \times 10^6$. Enveloped particles of 60-220 nm with club-shaped sparse spikes. Contains a helical nucleocapsid 9 nm diameter. Cytoplasmic, budding from Golgi and endoplasmic reticulum.



- Genera: Coronavirus [avian infectious bronchitis virus and related viruses, including equine arteritis virus]
 Torovirus [enveloped biconcave 130 nm particles with spikes. Helical nucleocapsid. Nucleus required for replication. Berne virus of horses].

- See: Horzinek, M. C. et al. (1987) A new family of vertebrate viruses: Toroviridae. *Intervirology*, 27, 17-24.
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